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### (54) Package for compressible products and method of making the package

(57) The present invention comprises a unitary flexible package (10) for enclosing and containing in a sealed condition one or more compressible products (100) in both a compressed and uncompressed condition. The package (10) comprises a first closure member (12) capable of sealing the package (10) in a first closed

condition defining a first volume, and a second closure member (14) capable of sealing the package (10) in a second closed condition defining a second volume, the second volume being greater than the first volume. A method for making the package (10) of the present invention is also disclosed.

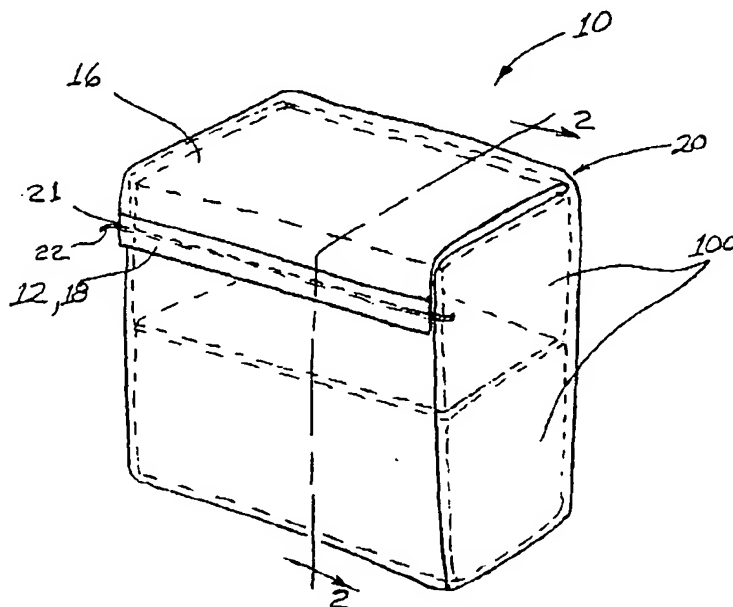


Fig 1

## Description

### FIELD OF THE INVENTION

[0001] This invention relates to packages that may be used for efficiently packaging and shipping compressible products, and methods for making such packages.

### BACKGROUND OF THE INVENTION

[0002] When transporting finished products from the point of manufacture to the point of sale, or to an intermediate storage facility, it is often desirable to enclose a plurality of products within a larger, more durable package. Not only does this preserve the products in their desired, saleable condition, it minimizes the number of individual items to be handled and generally provides more uniformly shaped items for stacking and handling.

[0003] Through the years such packages have frequently taken the form of conventional, often rectangular, rigid or semi-rigid packages formed of corrugated or non-corrugated cardboard having dimensions suitable for enclosing a predetermined number of finished products. For other products requiring protection from contamination but not from physical harm, "soft" flexible packaging materials such as polymeric films and papers of varying thickness have been employed in similar fashion. While such packages have proven effective in protecting the finished products during transport and storage, they are generally inefficient in terms of space occupied and material required for transporting and storing compressible products having significant void volume within.

[0004] In an effort to address this shortcoming, various packaging types have been devised for containing compressible products in a compressed condition, that is, under pressure. In addition, various method have been devised for subjecting compressible products to compressive forces prior to their being loaded into a package such that the package holds them under tension until it is opened. For example, one such package and method is disclosed in EP-A-0 942 881, which discloses a package for efficiently packaging and shipping compressible products, and a method for producing such a package.

[0005] One drawback to current compressible packages for storing and shipping compressible products in a compressed condition is the problem of adequately containing and/or storing the compressible product after the shipping package is opened, for example by the consumer. Many compressible products exhibit sufficient recovery such that after opening the shipping package, the compressed products therein tend to recover, such as by expansion, such that the original packaging can no longer adequately contain the product. This presents problems for the user of the packaged products. For example, if the compressible product requires storage in a sealed condition, it may no longer be possible to seal

the package against environmental conditions.

[0006] Another problem associated with current compressible packages is that they are often difficult to open. For example, a package of compressed products often stressed at the seams such that there is little material to grip for opening. Opening with sharp objects such as knives, scissors, and the like can damage the contents of the package.

[0007] Another problem of current compressible packages, particularly for discrete compressed articles, is the difficulty of removing the first (or more) of the packaged articles. Often the consumer must expend significant effort to dispense the first article from the package since it is packed in a tightly compressed manner.

[0008] While not being limited to such products, one exemplary class of products often shipped in a compressed condition is disposable absorbent products. For example, disposable diapers can be highly compressed and packaged to minimize shipping and storage space requirements. After the consumer opens the original packaging, however, the diapers inside can recover a certain percentage of their original, pre-compressed, volume to an extent that they can no longer be adequately re-closed in the original packaging. This creates a problem for the consumer, who wishes to re-seal the remaining diapers against environmental contaminants and moisture.

[0009] Accordingly, it would be desirable to have a package for containing compressible products that can be packaged in a compressed, low volume configuration, and yet allow for re-sealing after opening and recovery of the compressed products therein.

[0010] Additionally, it would be desirable to have a package for containing compressible products that can be easily opened.

[0011] Further, it would be desirable to have a package for shipping and storing compressible products that permits easy removal of the first of the packaged products upon opening of the package.

[0012] Finally, it would be desirable to have a method for making such a package.

### BRIEF SUMMARY OF THE INVENTION

[0013] The present invention comprises a unitary flexible package for enclosing and containing in a sealed condition one or more compressible products in both a compressed and uncompressed condition. The package comprises a first closure member capable of sealing the package in a first closed condition defining a first volume, and a second closure member capable of sealing the package in a second closed condition defining a second volume, the second volume being greater than the first volume. The package can have at least one flap for folding a portion of the package into a compact, low volume package.

[0014] A method for making a package of the present invention having at least one flap is disclosed, the meth-

od comprising the steps of:

providing a continuous sleeve of material having a first open end and a second open end;  
 joining to the first open end a second closure member;  
 folding the first open end at a fold to form a flap;  
 joining the flap to the continuous sleeve of material to form a first closure member at a first closed end;  
 placing the products into the continuous sleeve of material;  
 compressing the products;  
 closing the second end of sleeve of material to contain the products in a compressed condition.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

[0015] While the specification concludes with claims pointing out and distinctly claiming the present invention, it is believed the same will be better understood by the following drawings taken in conjunction with the accompanying specification wherein like components are given the same reference number.

[0016] FIG. 1 is a perspective view of one embodiment of a package of the present invention.

[0017] FIG. 2 is a cross-sectional view of the package shown in Figure 1 prior to opening the first closure member.

[0018] FIG. 3 is a cross-sectional view of the package similar to that shown in Figure 2, after opening the first closure member.

[0019] FIG. 4 is a partial cut away perspective view of one embodiment of a package of the present invention.

[0020] FIG. 5 is a partial cut away perspective view of the embodiment shown in FIG. 4, showing compression forces.

### **DETAILED DESCRIPTION OF THE INVENTION**

[0021] As used herein, the term "joined" encompasses configurations whereby an element is directly secured to another element by affixing the element directly to the other element, and configurations whereby an element is indirectly secured to another element by affixing the element to intermediate member(s) that in turn are affixed to the other element.

[0022] As used herein, the term "unitary" refers to packaging that is formed of separate parts joined together to form a coordinated entity. For example, packaging comprising flexible, polymeric film that is formed, folded, sealed and possibly joined to other components, such as closure mechanisms as a coordinated entity is "unitary". Likewise, a package, such as a plastic bag, separately contained inside another package, such as a paperboard box, would not together be considered to be "unitary".

[0023] FIG. 1 is a perspective view of one embodiment of a unitary flexible package 10 for enclosing and

containing in a sealed condition one or more compressible products 100. As shown, package 10 can be generally rectangular parallelepiped in shape, although other shapes can be used, depending primarily on the compressible products 100 contained therein. Package 10 can be constructed in any desired dimensions, depending upon the particular product(s) 100 to be contained therein.

[0024] Package 10 of the present invention can be fabricated from a wide variety of suitable materials including, but not limited to, paper, woven fabrics, and plastic, including polymer films. Polymer films preferably have sufficient strength and resistance to creep deformation so as to package compressed articles. Such polymer materials are known in the art for compressed article packaging, and include, for example, thermoplastic polymer films, such as polyethylene, polyolefins, and polyesters. One preferred material for packaging articles such as disposable diapers is linear low density polyethylene (LLDPE) having a thickness between about 5 micrometers and 5 mm in thickness. In general, the thickness of the packaging material is dependent upon the products being packaged and the amount of compression. Thermoplastic polymer films facilitate the securing by application of heat of seams, pleats, and flaps, as is known in the art. Other means of securing various seams and flaps of package 10, as well as securing volume reducing pleats in the assembled condition can be used, such as tape, staples, and adhesives, of which hot melt adhesives are presently preferred. Once package 10 is formed, filled, and sealed by methods known in the art for forming and filling packages of compressed articles, the package is considered to be unitary.

[0025] The compressible products 100 may include solid, individual compressible items, but also may include individual compressible packages that each enclose a compressible product or products in liquid, powdered, granular, particular, or discrete forms. For products in "loose" form such as liquids and particulate materials, suitable means to contain the product during the compression process should be employed to prevent product loss. Accordingly, package 10 of the present invention may contain a single individual product 100, for example a re-usable product, such as a sponge, that can be re-sealed in the package 10 between uses. However, the package 10 of the present invention is particularly suitable for containing a plurality of products 100, which may themselves be packages or carriers of individual product units.

[0026] Products 100 of particular interest in accordance with the present invention include products which are resiliently compressible, i.e., which can be compressed by a compressive force, and yet tend to return completely, substantially, or at least partially, to their original volume and external dimensions when the compressive force is released. Products of this type include clothing, pillows, sponges, cotton batting, cotton balls,

building materials such as fiber insulation batting, and disposable absorbent articles, such as diapers, feminine hygiene products, and adult incontinence products, as well as paper and tissue products such as paper towels, bathroom tissue, facial tissue, wipes, table napkins, as well as a wide variety of other products.

**[0027]** Package 10 of the present invention is a package for containing compressible products that can be shipped in a compressed, low volume configuration, and yet allow for easy opening, easy removal of the products therein after opening, and proper containment and re-sealing after opening and removal of the compressed products therein. Package 10, therefore, can have two closure members, 12 and 14 as shown in FIGS. 1-3. First closure member 12 keeps package 10 closed in a first closed position, as shown in FIGS 1 and 2, in which FIG. 2 is a cross-sectional depiction of package 10 in a first closed condition. In the first closed condition package 10 defines a first volume V1, which is the volume of the enclosed interior space defined by the side walls 11 of the package 10 when the products therein are in their compressed condition, for example, in the shipping condition, and the package 10 is secured by first fastener 12 in a closed condition. Thus, in a first closed condition, the package can contain at least one product 100 in a compressed, reduced volume, condition.

**[0028]** First closure member 12 can be any member capable of maintaining a portion of package 10, such as flap 16, in a closed position to maintain the first volume V1 until first closure member 12 is released, unfastened, removed, or otherwise opened. Thus, first closure member 12 can be any of known closure means, including heat sealing, ultra sonic sealing, and mechanical fastening devices, such as hook and loop fasteners. In one embodiment, as shown in FIGS. 1-3, first closure member 12 can be an adhesive tape 18 that adhesively seals flap 16 in a folded configuration. Adhesive tape 18 can be any suitable adhesive tape known in the art, but preferably can be a tape having a line of weakness 21, such as a perforation, and/or a release strip 22, such as a tear string or tape (as shown in FIGS. 1-2), to enable simple opening of first closure member 12. For example, a line of weakness 21, with or without a release strip 22 associated therewith, can facilitate the rupture of the tape into two parts, 12a and 12b, as shown in FIG. 3. Once ruptured in this manner, first closure member 12 is not intended to be reused, but in some embodiments could have re-sealing capability.

**[0029]** After first closure member 12 is released, flap 16, which can be formed, for example as shown in FIG. 2, by a fold 20 in a portion of side walls 11 of the package 10, can unfold. The unfolding of flap 16 creates additional volume within package 10. That is, once flap 16 is unfolded, additional volume designated as space 25 in FIG. 3 is available within package 10. Compressible products 100 can thereby expand back to a portion of their uncompressed volume while still being contained within package 10, which now is in a second condition,

which when closed by second closure member, defines a second volume V2, which is greater than first volume V1. In the second closed condition package 10 defines a second volume V2, which is the volume of the enclosed interior space defined by the side walls 11 of the package 10 when the second closure is closed.

**[0030]** Compressible products 100 can be compressed to a fraction of their pre-compression volume, depending on what type of product they are. For example, certain sponges can be compressed to one-half their uncompressed volume. Disposable absorbent articles, such as diapers having cellulosic fluff absorbent cores, can be folded and compressed to a thickness that is 60% of their folded, uncompressed thickness. In general, a package of the present invention can have a volume V1 that is 10% to 90% of the second volume V2. The package of the present invention can have a volume V1 that is 50% to 80% of the volume V2. The package of the present invention, when used to package disposable absorbent articles, can have a volume V1 that is 60%-70% of volume V2. For highly compressible products, V2 can be 200% or more of V1.

**[0031]** Second closure member 14 can close, and preferably seal, package 10 when package 10 is in a second closed condition defining second volume V2. Therefore, second closure member 14 can be a slide lock closure, such as is known in the art as ZIPLOC® closures. Second closure member 14 can also be adhesively reclosable, such as with hot melt adhesive, or by an adhesive tape tab fastener. Second closure member 14 can also comprise mechanical fasteners such as hook and loop fasteners.

**[0032]** If second closure member 14 is intended to be an air-tight sealed closure, it can be in a non-air-tight condition prior to opening of first closure member 12. That is, second closure member 14 can be un-closed prior to opening first closure member such that the added volume can be filled, at least initially, with air to permit adequate expansion of the volume of package 10 from the first volume V1 to the second volume V2. Of course, second closure member 14 can be in a closed, sealed position, which may require partial opening to permit entry of air for volume expansion of package 10.

**[0033]** Therefore, in the most general sense, the package of the present invention can be described as a unitary flexible package 10 for enclosing and containing in a sealed condition one or more compressible products 100 in both a compressed and uncompressed condition. The package can be produced and shipped with the products in a compressed condition. To enable the package to be opened easily, and reclosed after initial opening, for example by the consumer of the products, the package can have a first closure member 12 capable of sealing the package in a first closed condition defining a first volume, and a second closure member 14 capable of sealing the package in a second closed condition defining a second volume, the second volume being greater than said first volume. In this manner, since the sec-

and volume is greater than the first volume, the enclosed products can be much easier to remove, no longer being in their compressed condition.

**[0034]** The term "sealing" as used herein with respect to first and second closure members 12, 14, refers to "closing" so as to contain the products within the package. The term can refer to air-tight or water-tight seals, but is not limited to such seals.

**[0035]** Various other package configurations can be implemented without departing from the above description. For example, two or more folds 16 can be utilized depending on where it is desired that the first closure member be disposed on the finished package of compressed products. In one embodiment, a fan-fold can be used to accomplish the function of fold 16. In another embodiment, two or more first closure members 12 can be used, one or more associated with each fold 16. In general, the greater the difference between V1 and V2, the greater number of folds 16 may be necessary to efficiently and neatly package the excess side wall material 11 of the packaging prior to opening of the first closure member 12.

**[0036]** In another variation the first closure member 12 could be as depicted in FIG. 4, where flap 16 is secured by way of a line of adhesive, such as hot melt adhesive. Rather than adhesive attachment, flap 16 could be secured in a first closed position by way of heat sealing the portions of side wall 11 thermoplastic polymer package material in the region of first closure member 12.

**[0037]** In another variation, also depicted in FIG. 4, a compression-resistant seal 24 can be supplied adjacent the region of fold 16. In this manner, first closure member 12 can be released, and flap 16 can be unfolded, prior to release of the pressure exerted by compressed products 100. To release the pressure exerted by compressed products 100 and allow package 10 to expand to the second volume V1, seal 24 must first be broken. One method of making seal 24 is by releasable adhesive, that is, adhesive that has sufficient adhesion to be compression resistant, but nevertheless has a low enough peel force to permit separation of the portions of the package material that are adhered together thereby. Although compression-resistant seal 24 is shown in relationship to the configuration shown in FIG. 4, the seal 24 can be utilized in combination with other configurations, such as that shown in FIG. 2, for example.

**[0038]** While the invention is disclosed herein primarily in embodiments having a flap (or flaps) 16, this is because such a configuration represents the current best approach for commercial viability. That is, a flap 16 is a convenient way of configuring the package 10 for compact shipping, without having excess material being loose in an uncontrolled manner. However, certain embodiments are contemplated in which there would be no flap 16 folded at a fold 20 as shown. For example, the embodiment shown in FIG. 4 can be reconfigured such that there is no fold 20 or flap 16 in the finished package.

The seal 24 would then be the first closure member 12, with means to open it, for example, by pulling apart a seam of pressure sensitive adhesive. Thus the package material between the seal 24 and the second closure member 14 would not need to be folded and sealed as a flap, but could be simply left unsealed to the package. Such a configuration may be beneficial in packages requiring little difference between the first volume V1 and the second volume V2.

**[0039]** FIG. 5 shows another embodiment of a package 10 of the present invention having an optional handle 26 on one side thereof, which can be unitarily formed with the package. The package 10 is formed from flexible packaging material such as polymeric film or Kraft paper, for example, such that the various folds and pleats can be made easily in high speed production, as is known in the art.

**[0040]** Known methods for packaging compressed products in flexible packaging can be used to make the packages of the present invention. Such methods can include "on line" continuous processes, or "off line" batch processes. For example, known "flow wrap" technology can be adapted to form the compression packaging by the use of continuous webs of polymer film formed into a continuous sleeve of material in the X axis, as shown in FIG. 4. The material can be subsequently formed, folded, and/or pleated and heat sealed at the two open ends to form a closed, unitary package 10. Because the material is formable/deformable and flexible, pleats may optionally be pre-formed or may be formed from the sheet material during the course of the product compression.

**[0041]** In the package shown in FIG. 5, products 100 are a plurality of folded disposable diapers that have been compressed in the direction indicated by the X axis, for example, during final assembly of the package. The packaging process can include, for example, in either a batch or a continuous process, forming a sleeve of material 30 continuous in the Z-Y axis (i.e., a tube of material, e.g., formed by heat sealing opposing edges of a web of material to form a flexible, formable, cylindrical tube as known in the art). The sleeve of material 30 can be cut to length to be open at two ends oriented in the X axis, one of which ends, called the first end herein, can have a second closure member applied thereto (the end on the right hand side of FIGS. 5 and 6, for example). The first end is then folded at fold 20 to form flap 16. First end is formed into the finished package condition by joining the flap 16 to the packaging material 30, as described above with respect to FIGS 1-4 to form first closure member 12.

**[0042]** Product(s) 100 can be placed into continuous sleeve 30 by any suitable method, depending on the particular product(s) being packaged. For example, for the diapers shown in FIGS 5-6, individual diapers can be supplied in a predetermined quantity of folded, stacked, diapers, and introduced into sleeve 30 by means known in the art. After placement of products 100

into sleeve 30. compression can be applied in the direction of the X-axis as shown by the lines of external force F in FIG. 6. The external force F can be applied by plunger or other means known in the art while the package is constrained. After sufficient compression of products 100, pleats 32 formed by folding inwardly sleeve material 30 at the second open end of the package where compression is being applied. In one suitable process, a separate end piece 34 of package material 30 is compressed with products 100. Pleats 32 are folded and sealed, such as by heat sealing, onto end piece 34 to form a closed, unitary package 10. In certain embodiments, it may not be necessary to include end piece 34; pleats 32 being folded and heat sealed at the corners, for example, can have sufficient strength to hold products 100 in the compressed condition. In any method, the second open end of the sleeve of material 30 is closed to sufficiently contain products 100 in a compressed condition.

[0043] In another process, the products 100 are first compressed, for example in an off line process, and introduced in the compressed condition into the packaging material for closure into a unitary package.

[0044] Once adequate formation and sealing of pleats 32 and/or end piece 34 is complete, external force F can be removed, resulting in a finished, unitary, flexible package 10 enclosing an containing in a sealed condition a plurality of compressible products 100 in a first volume V1.

[0045] Various modifications of the method described can be employed without departing from the scope of the invention. For example, the products 100 can be placed into continuous sleeve of material 30 prior to closing either the first or second ends of package 10. Likewise, the second end (not having first and second closure members 12, 14, associated therewith) can be closed first, and then the first end can be closed.

[0046] While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other combinations and modifications can be made without departing from the scope of the invention. It is therefore intended to cover in the appended claims all such combinations and modifications that are within the scope of this invention.

## Claims

1. A unitary flexible package (10) for enclosing and containing in a sealed condition one or more compressible products (100) in both a compressed and uncompressed condition, **characterized in that** said package comprises a first closure member (12) capable of sealing said package (10) in a first closed condition defining a first volume, and a second closure member (14) capable of sealing said package (10) in a second closed condition defining a second

volume, said second volume being greater than said first volume.

2. The flexible package (10) of Claim 1 wherein said package (10) comprises polymeric material, preferably low density polyethylene.
3. The flexible package (10) of Claim 1 wherein said first closure member (12) comprises adhesive.
4. The flexible package (10) of Claim 3 wherein said adhesive is in the form of adhesive tape (18).
5. The flexible package (10) of Claim 4 wherein said adhesive tape (18) comprises a line of weakness (21) to permit rupture and opening of said first closure member (12).
6. The flexible package (10) of Claim 5 wherein said adhesive tape (18) comprises a release strip (22).
7. The flexible package (10) of Claim 1 wherein said second closure member (14) is re-sealable and comprises an air-tight sealing member.
8. The flexible package (10) of Claim 1 wherein said first volume is from 10% to 90% of said second volume.
9. A method for making a flexible package (10) to contain products (100) in a compressed condition, the method **characterized by** the steps of:
  - a. providing a continuous sleeve of material (30) having a first open end and a second open end;
  - b. joining to said first open end a second closure member (14);
  - c. folding said first open end at a fold (20) to form a flap (16);
  - d. joining said flap (16) to said continuous sleeve of material (30) to form a first closure member (12) at a first closed end;
  - e. placing the products (100) into said continuous sleeve of material;
  - f. compressing the products (100);
  - g. closing said second end of sleeve of material (30) to contain the products (100) in a compressed condition.
10. The method of Claim 9, wherein steps (e) and (f) are reversed.

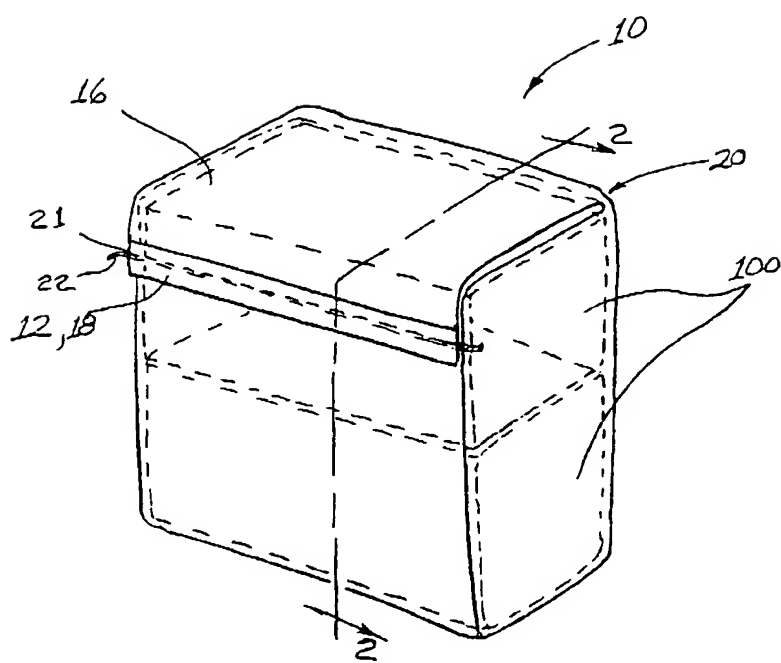


FIG 1

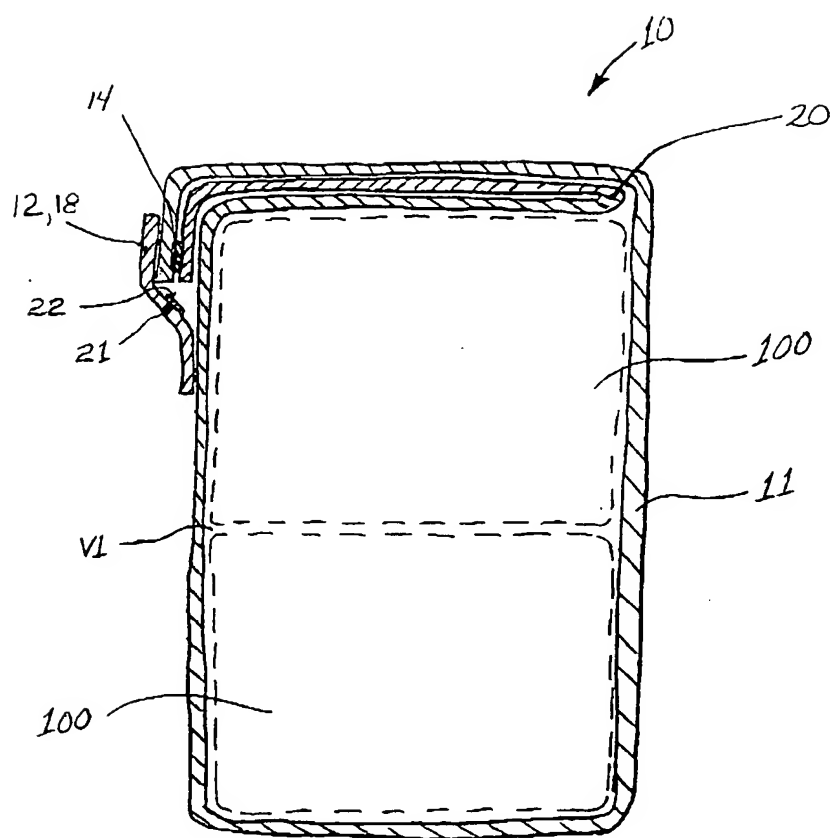


FIG 2



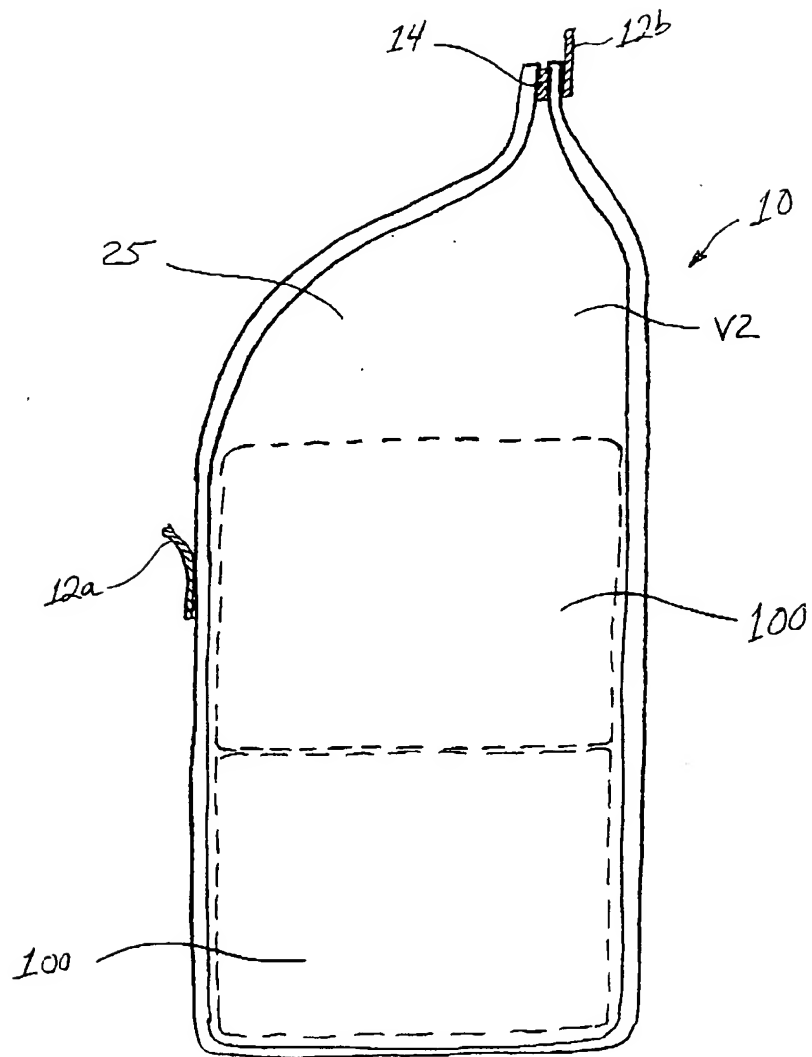


FIG 3

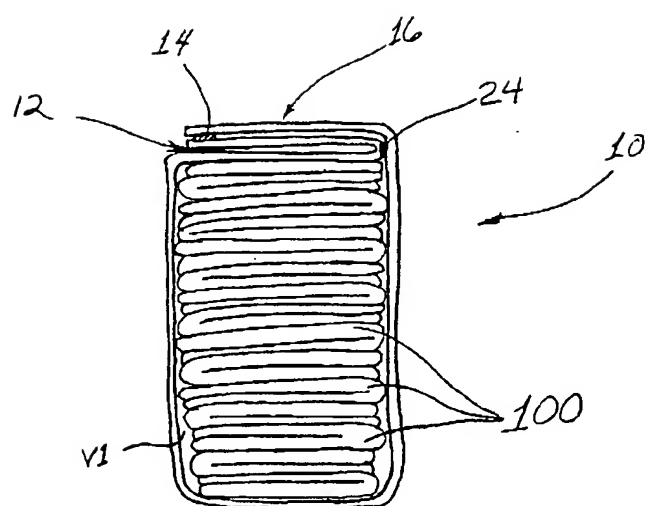
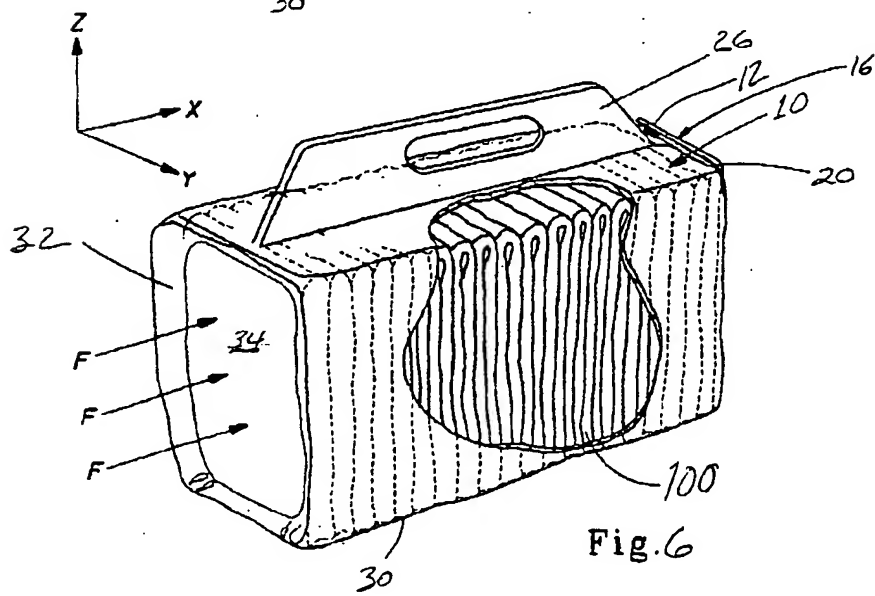
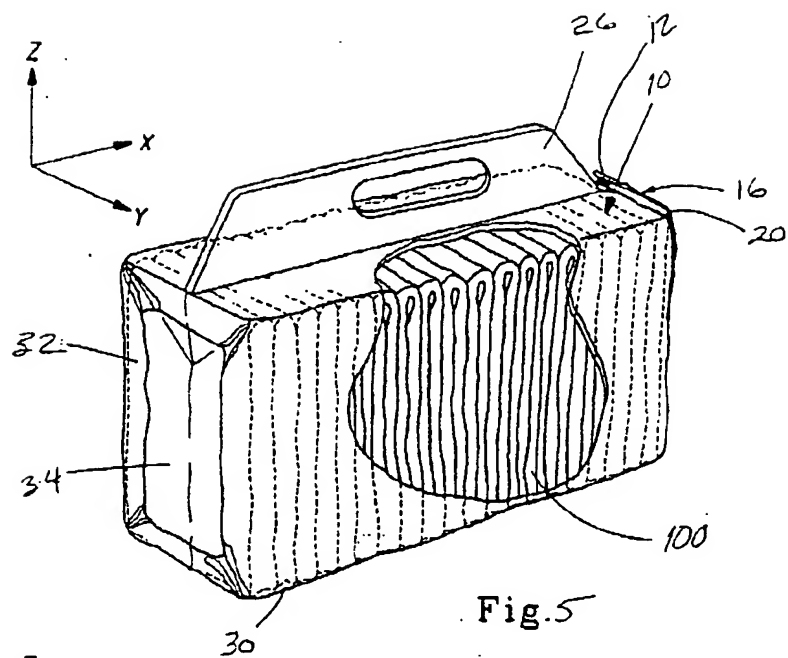


FIG 4





European Patent  
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Application Number  
EP 01 13 0772

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The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 23 May 2002	Examiner Berrington, N
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application I : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04001)



European Patent  
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# EUROPEAN SEARCH REPORT

Application Number  
EP 01 13 0772

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Place of search <b>MUNICH</b>		Date of completion of the search <b>23 May 2002</b>	Examiner <b>Berrington, N</b>
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EPF FORM 1503 (10.82) (P&C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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